

WHAT IS CLAIMED IS:

1 1. A nanoparticle processed textile and polymer system, said nanoparticle
2 processed textile and polymer system comprising:

3 a textile material having an embedded nanoparticle.

1 2. The nanoparticle processed textile and polymer system of claim 1,
2 wherein said textile material is a member selected from the group consisting of fabric, yarn
3 and fiber.

1 3. The nanoparticle processed textile and polymer system of claim 1,
2 wherein said textile material is a member selected from the group consisting of cellulose,
3 cotton, linen, hemp, jute, ramie, wool, mohair, vicuna, silk, rayon, lyocell, acetate, triacetate,
4 azlon, acrylic, aramid, nylon, olefin, polyester, spandex, vinyon, vinal, graphite, metallic
5 textiles, ceramic textiles and mixtures thereof.

1 4. The nanoparticle processed textile and polymer system of claim 2,
2 wherein said textile material is a fabric selected from the group consisting of cellulosic,
3 cellulosic-synthetic blend, and synthetic material.

1 5. The nanoparticle processed textile and polymer system of claim 4,
2 wherein said textile material is cellulosic.

1 6. The nanoparticle processed textile and polymer system of claim 5,
2 wherein said cellulosic material is fabricated into a member selected from the group
3 consisting of a diaper, napkin, a table cloth, a bandage, a gauze, an underpant, a medical
4 garment, a surgeon's gown, a cap, a mask, a surgical cover, a patient drape, a carpeting, a
5 bedding material, an underwear, a sock, and a uniform.

1 7. The nanoparticle processed textile and polymer system of claim 4,
2 wherein said textile material is a synthetic polymer selected from the group consisting of
3 PET, acrylic and nylon.

1 8. The nanoparticle processed textile and polymer system of claim 1,
2 wherein the size of said nanoparticle is about 10^{-9} m to about 10^{-7} m.

1 9. The nanoparticle processed textile and polymer system of claim 1,
2 wherein said nanoparticle is selected from the group consisting of an organic nanoparticle
3 and an inorganic nanoparticle.

1 10. The nanoparticle processed textile and polymer system of claim 9,
2 wherein said inorganic nanoparticle is a metal oxide.

1 11. The nanoparticle processed textile and polymer system of claim 10,
2 wherein said metal oxide is selected from the group consisting of Fe_2O_3 , SiO_2 , Ag_2O , and
3 CuO .

1 12. The nanoparticle processed textile and polymer system of claim 9,
2 wherein said inorganic nanoparticle is a metal.

1 13. The nanoparticle processed textile and polymer system of claim 12,
2 wherein said metal is selected from the group consisting Ag, Cu, Fe, and Zn.

1 14. The nanoparticle processed textile and polymer system of claim 9,
2 wherein said nanoparticle is a carbon-black nanoparticle.

1 15. The nanoparticle processed textile and polymer system of claim 1,
2 wherein said embedded nanoparticle imparts a functionality selected from the group
3 consisting of coloration, a waterproof finishing, soil repellent finishing, fire resistance
4 finishing, wrinkle free finishing, anti-UV finishing, antimicrobial finishing and antistatic
5 finishing.

1 16. A nanoparticle formulation for textiles, said formulation comprising:
2 a nanoparticle;
3 a dispersant; and
4 optionally a thickener.

1 17. The nanoparticle formulation for textiles of claim 16, wherein said
2 nanoparticle is selected from the group consisting of an organic nanoparticle and an inorganic
3 nanoparticle.

1 18. The nanoparticle formulation for textiles of claim 16, wherein said
2 nanoparticle is a carbon-black nanoparticle.

1 19. The nanoparticle formulation for textiles of claim 16, wherein said
2 dispersant is selected from an anionic surfactant, a cationic surfactant, a nonionic surfactant,
3 and a zwitterionic surfactant.

1 20. The nanoparticle formulation for textiles of claim 16, wherein said
2 dispersant is a polymeric dispersant selected from the group consisting of a polyacrylic acid
3 and salt thereof.

1 21. The nanoparticle formulation for textiles of claim 16, wherein said
2 polyacrylic salt is selected from the group consisting of polyacrylate, polyethylenimine, oxo
3 alcohol, and copolymeric carboxylate.

1 22. The nanoparticle formulation for textiles of claim 16, further
2 comprising a thickener.

1 23. The nanoparticle formulation for textiles of claim 16, wherein said
2 thickener is selected from the group consisting of starch, modified starch, modified cellulose,
3 polyvinyl acetate, polyvinyl alcohol, polyethylene glycol, polyacrylates, silicones and
4 copolymers of vinyl polymers.

1 24. A method for making a nanoparticle processed polymer composition,
2 said method comprising:
3 diffusing a nanoparticle into a polymer matrix to form an embedded
4 nanoparticle in said polymer matrix, thereby making said nanoparticle processed polymer
5 composition.

1 25. The method for making a nanoparticle processed polymer composition
2 of claim 24, wherein said nanoparticle diffuses at the glass-transition temperature of said
3 polymer matrix.

1 26. The method for making a nanoparticle processed polymer composition
2 of claim 24, wherein the free volume of said polymer matrix is greater in diameter than said
3 nanoparticle.

1 27. The method for making a nanoparticle processed polymer composition
2 of claim 24, wherein said polymer matrix is heated to above its glass transition temperature
3 prior to facilitate the diffusion of said nanoparticle.

1 28. The method for making a nanoparticle processed polymer composition
2 of claim 24, wherein said polymer matrix is a member selected from the group consisting of
3 polyester, polyamide, polyethylene, polypropylene, polystyrene, polyvinylchloride
4 polyamideimide, polyethersulfone, polyarylsulfone, polyetherimide, polyarylate, polysulfone,
5 polycarbonate, polystyrene, polyetherketone, polyetheretherketone, polytetrafluoroethylene,
6 nylon-6,6, nylon-6,12, nylon-11, nylon-12, acetal resin, and aramid.

1 29. The method for making a nanoparticle processed polymer composition
2 of claim 28, wherein said polymer matrix is selected from the group consisting of PET and
3 acrylics.

1 30. A method for dyeing a textile having a polymeric matrix, said method
2 comprising:
3 diffusing a colored nanoparticle into a textile having a polymer matrix to form
4 an embedded colored nanoparticle in said textile having said polymer matrix, thereby dyeing
5 said textile.

1 31. The method for dyeing a textile having a polymeric matrix of claim 30,
2 wherein said colored nanoparticle diffuses at the glass-transition temperature of said polymer
3 matrix.

1 32. The method for dyeing a textile having a polymeric matrix of claim 30,
2 wherein the free volume of said polymer matrix is greater in diameter than said colored
3 nanoparticle.

1 33. The method for dyeing a textile having a polymeric matrix of claim 30,
2 wherein said polymer matrix is heated to above its glass transition temperature prior to
3 facilitate the diffusion of said colored nanoparticle.

1 34. The method for dyeing a textile having a polymeric matrix of claim 30,
2 wherein said polymer matrix is a member selected from the group consisting of polyester,
3 polyamide, polyethylene, polypropylene, polystyrene, polyvinylchloride polyamideimide,

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